

Amendments to the Drawings:

The attached sheets of drawings include changes to Fig. 1-3, Fig. 7D-7F, Fig. 9A-9H, Fig. 10A-10F, Fig. 11A-11D, Fig. 12C, Fig. 14C, Fig. 16A, Fig. 16D, Fig. 17A-17B, Fig. 18-19, Fig. 21, Fig. 22A-22C, and Fig. 23A-23C. These sheets, which include Fig. 1-3, Fig. 7A-7F, Fig. 9A-9H, Fig. 10A-10F, Fig. 11A-11D, Fig. 12A-12D, Fig. 14A-14D, Fig. 16A-16D, Fig. 17A-17B, Fig. 18-19, Fig. 21, Fig. 22A-22C, and Fig. 23A-23C replace the original sheets including Fig. 1-3, Fig. 7A-7F, Fig. 9A-9H, Fig. 10A-10F, Fig. 11A-11D, Fig. 12A-12D, Fig. 14A-14D, Fig. 16A-16D, Fig. 17A-17B, Fig. 18-19, Fig. 21, Fig. 22A-22C, and Fig. 23A-23C. Upon review of the following Figures: Fig. 1-3, Fig. 7D-7F, Fig. 9A-9H, Fig. 10A-10F, Fig. 11A-11D, Fig. 12C, Fig. 14C, Fig. 16D, Fig. 17A-17B, and Fig. 18-19, a printer driver was found to have caused erratic printing of hidden lines and shapes that were used to construct the illustrations. The printing error has been corrected and the superfluous lines as well as superfluous outlines around text have been corrected in these Figures. In Figure 16A, previously omitted element 150 has been added. Erroneous shift of optics system position in Fig. 14C has been corrected. Previously used reference words used in Figures 21, Fig. 22A-22C, and Fig. 23A-23C have been replaced with numerical reference signs.

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20 Attachment: Replacement Sheets

21 Annotated Sheets Showing Changes

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Remarks / Arguments:

1 2. Amendments to Specification:

2 3 In the Specification, on page 25, an error in a reference sign number has now been
4 corrected.

5 Numerical reference signs used in the amended Figures 17, 18, 21, 22, 23 have been
6 referenced in the Specification to reflect the words previously used to describe the
7 illustrations in these Figures with amended paragraphs on pages 20 and 24.

8 2. Amendments to Claims:

9 Claims 1-5, 7-10 and 12 remain in this application. Claims 6, 11, and 13-19 have
10 been canceled. Claims 20-29 are new.

11 Claim 1 has been amended to include the term “non-hemispherical”. It should be
12 noted that the present invention requires a high fill-factor of the lenslets in the microlens
13 array (page 5, lines 10-13) in order to obtain uniform illumination of a top-hat nature with
14 high efficiency. Regarding **Nemoto**, any optically transparent flat gap regions within the
15 tiling of the microlens array, such as that produced by tiling hemispheres or any circular-
16 shaped lenslets or microlenses, would result in non-refracted and non-diffracted light which
17 would contribute to hot-spot intensities in the central region of the expected top-hat output
18 intensity profile, thus not allowing a top-hat output profile to be formed.

19 Although limited to use of “hemispherical lenslets”, **Nemoto** teaches the case where
20 “two lens plates are aligned in an inclined direction in relation to a plane of the lens plate”,
21 similar to using a lateral or transverse offset in alignment, but does not include use of non-
22 equal pitch between the microlens arrays on front and back surfaces that would be required to
23 achieve full overlap of top-hat-profiled exit cones at a prescribed propagation distance as in

Fig. 16A-D.

Regarding Tedesco, it is proposed by the inventors' of the present invention that the term diffuser is typically used to describe an element that redirects light in a smooth manner. And although the output efficiencies can be high into profiles of desired size, random surface relief diffusers and holographic diffusers both typically produce gaussian-like or Lambertian-like output profiles. This is due to the variation in exit cone size from each of the random scatter centers of a diffuser, since a diffuser is not a periodic element of given pitch, as is a microlens array. As such, a rolloff in intensity would form at the edge of the profile such that it would not be possible to produce a high-efficiency ideal top-hat output profile from a diffuser. The present invention enables input light to be homogenized into a true top-hat output profile, and such that the output profile is also independent of input source wavelength, without the requirement of clipping the middle section of a profile to obtain a limited degree of output uniformity as would be required in the case of any output profile exhibiting edge rolloffs.

The examiner has acknowledged that claims 15 and 16 would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. The illumination system concerning the use of a source array and an optical sheet separated by a propagation distance so as to provide uniformity across position at an illumination plane is now described in Claim 20, as depicted in Fig. 12A-D, while a similar system having optical system disposed in the distance between source array and optical sheet is described in Claim 23, as depicted in Fig. 2, so as to provide a top-hat uniformity profile at an illumination plane. Similarly, the illumination system concerning the use of a source array and two optical sheets separated by a propagation distances so as to achieve uniformity across

1 position as well as versus angle is now described in Claim 24, as depicted in Fig. 14A-D,
2 while a similar system having optical systems disposed within the distances between source
3 array and first optical and first and second optical sheet is described in Claim 27 so as to
4 provide a top-hat uniformity profile across position at a first illumination plane as well as
5 across position and versus angle at a second illumination plane, as depicted in Fig. 3.

6 The new claims 20-28 are intended to better describe the illumination system cases as
7 stated than the previous Claims 14, 15, and 17.

8 3. Amendments to Drawings:

9 In amended Figure 16A, the previously omitted element numeral 150 has been added.
10 In Fig. 1-3, Fig. 7D-7F, Fig. 9A-9H, Fig. 10A-10F, Fig. 11A-11D, Fig. 12C, Fig. 14C,
11 Fig. 16A, Fig. 16D, Fig. 17A-17B, and Fig. 18-19, erroneous lines in the illustrations have
12 been corrected. Upon review, these errors were found to be caused by printer errors and have
13 now been corrected. Previously used reference words used in Figures 21, 22, and 23 have
14 been replaced with numerical reference signs. Extra words in Figures 17 and 18 have been
15 removed.

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17 Respectfully submitted,

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Amdt. dated Dec. 5, 2005
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Annotated Sheet Showing Changes

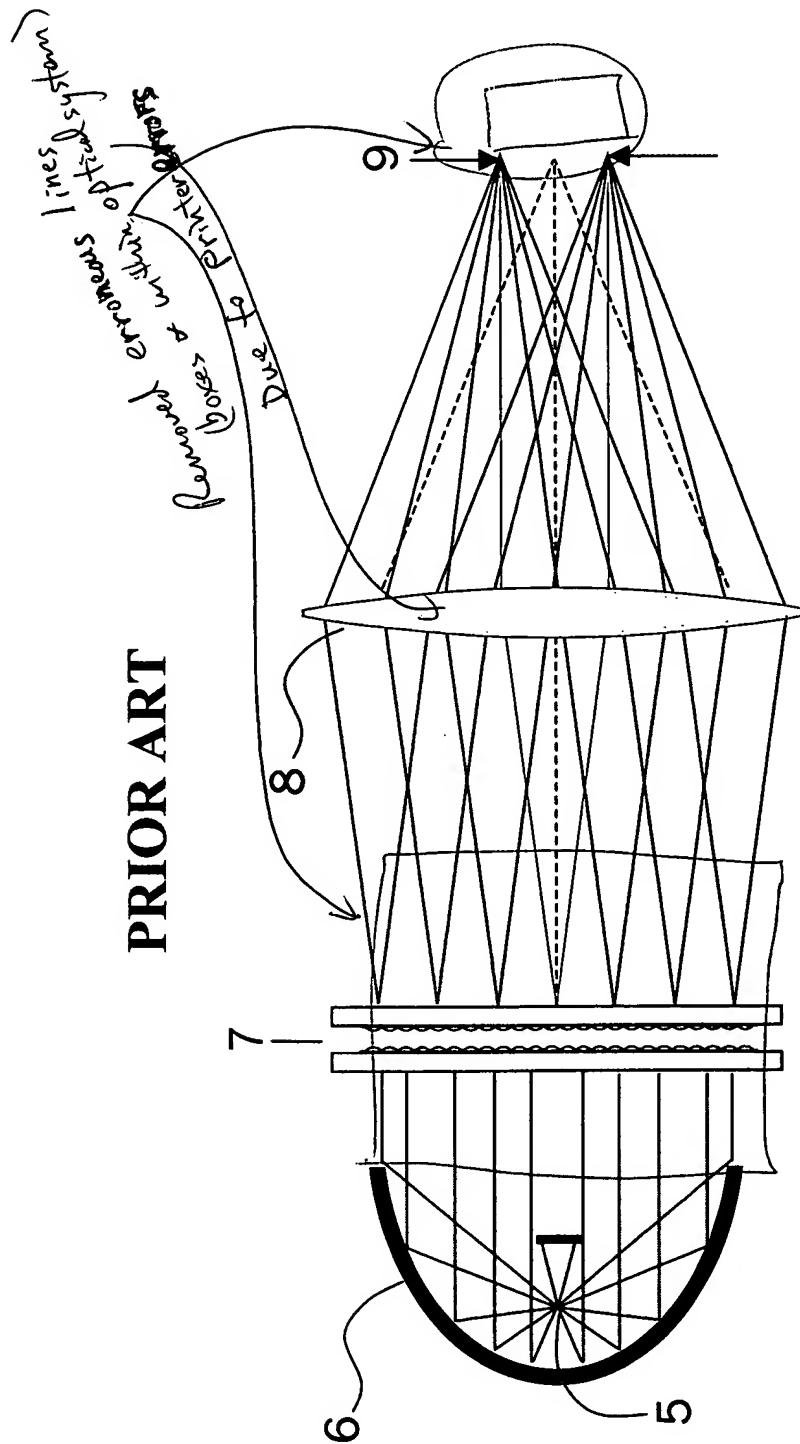


Fig. 1

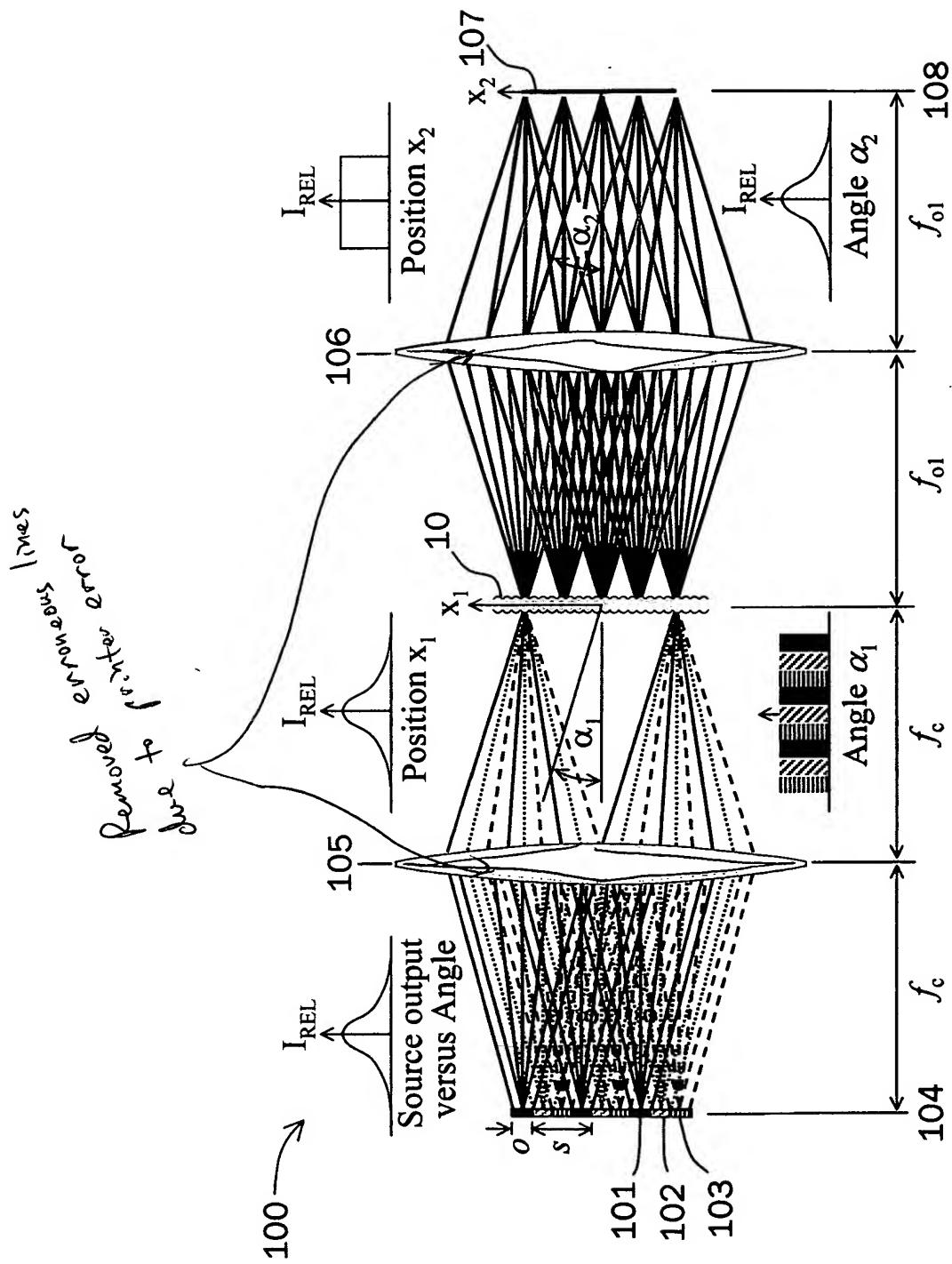


Fig. 2

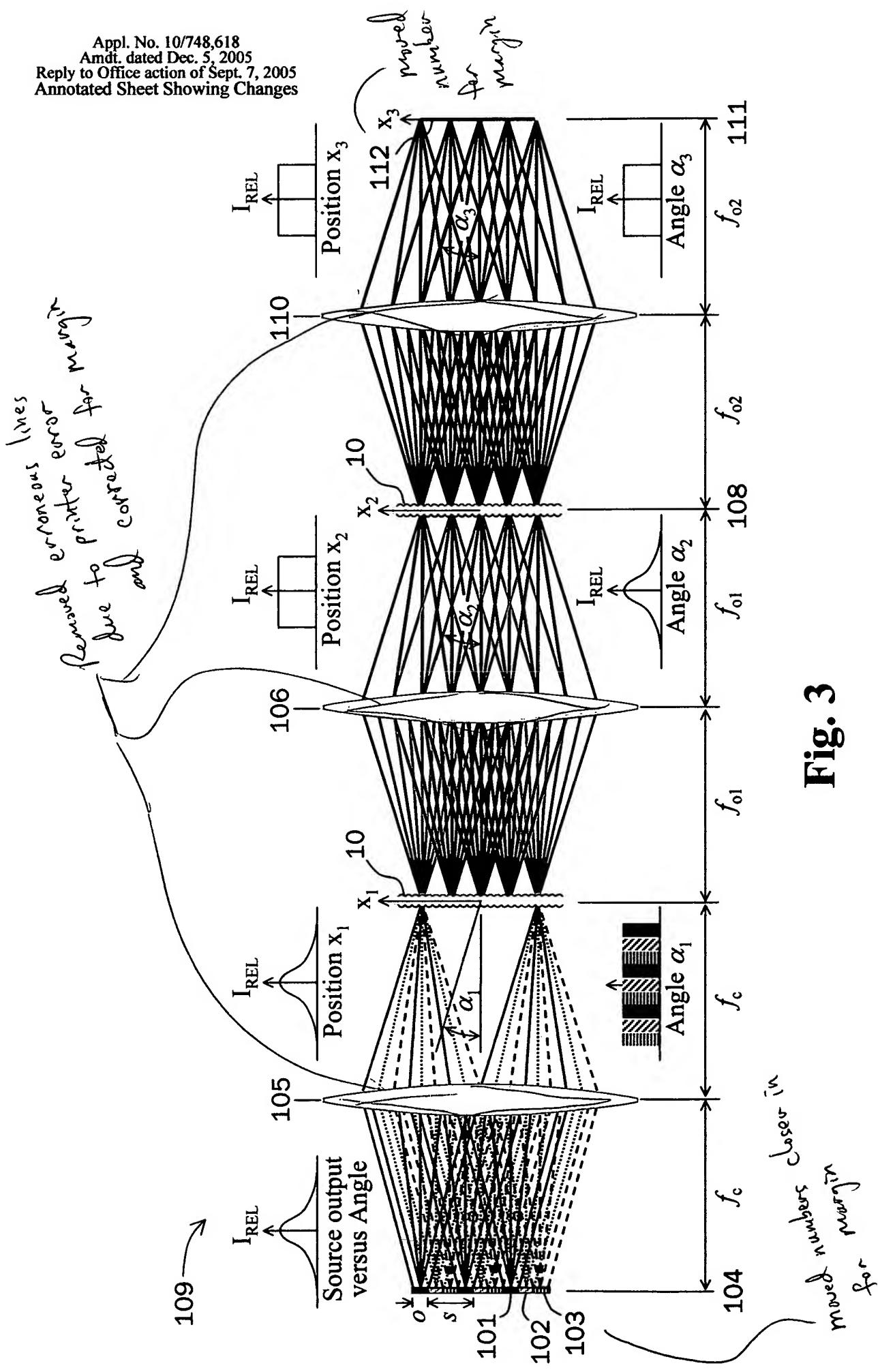


Fig. 3

Removed erroneous lines
Repaired to correct error
but

Fig. 7A

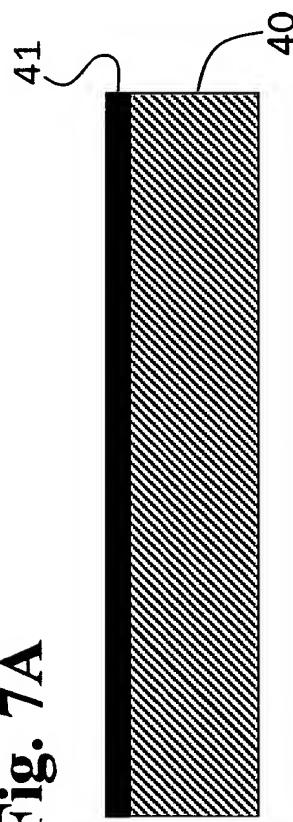


Fig. 7B

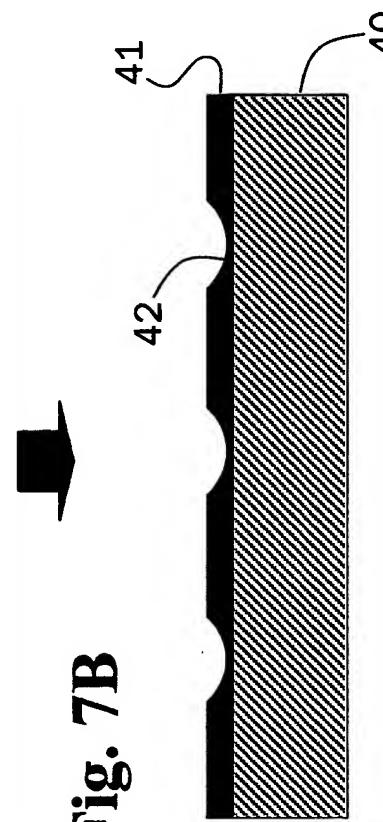


Fig. 7C

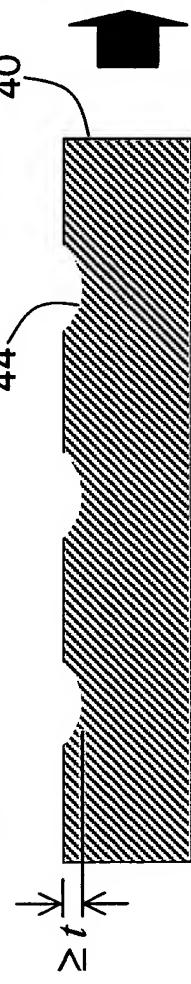


Fig. 7F

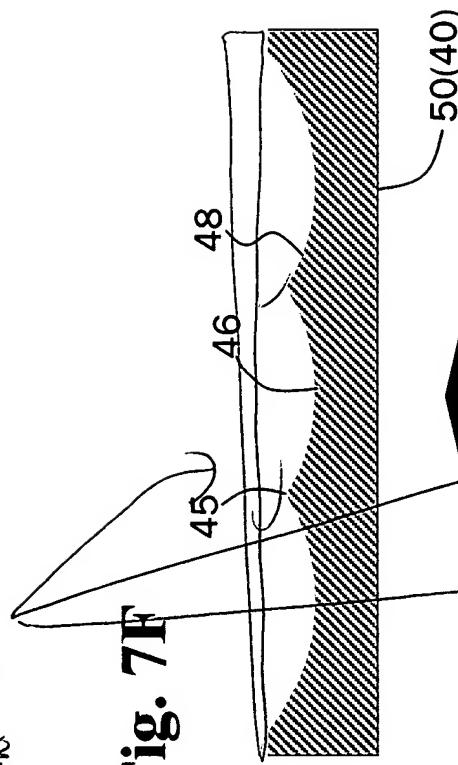


Fig. 7E

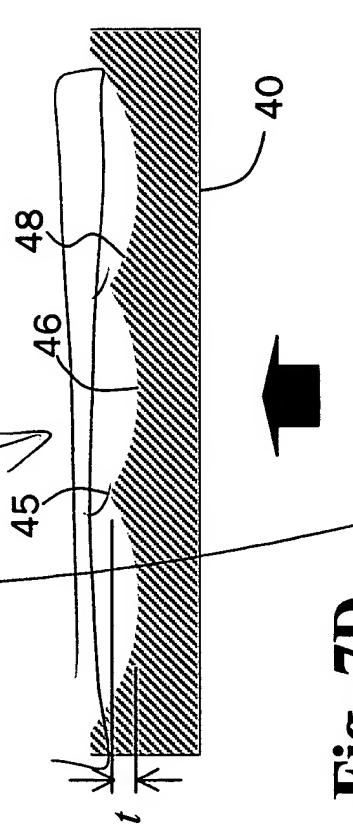


Fig. 7D

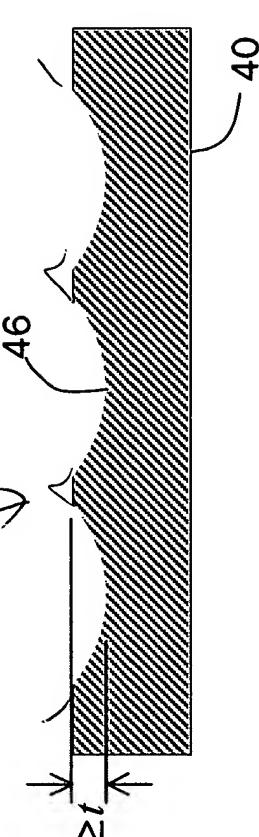


Fig. 9H
Improved readability
and improved resolution
of graphics

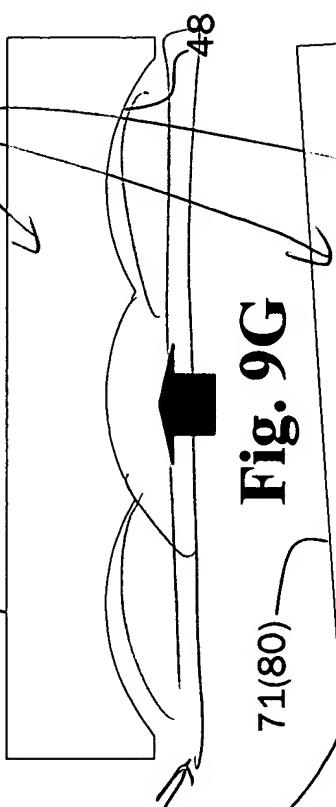


Fig. 9G

71(80)

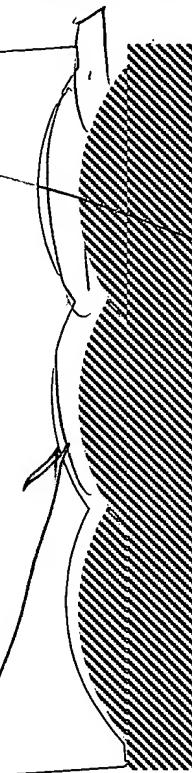


Fig. 9F
71(80)

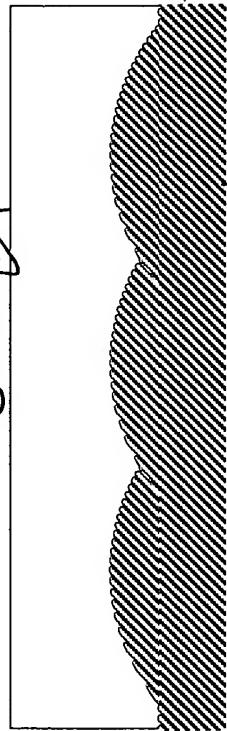


Fig. 9E
72



Removed erroneous lines
and printer error
due to 80

Fig. 9A



Fig. 9B

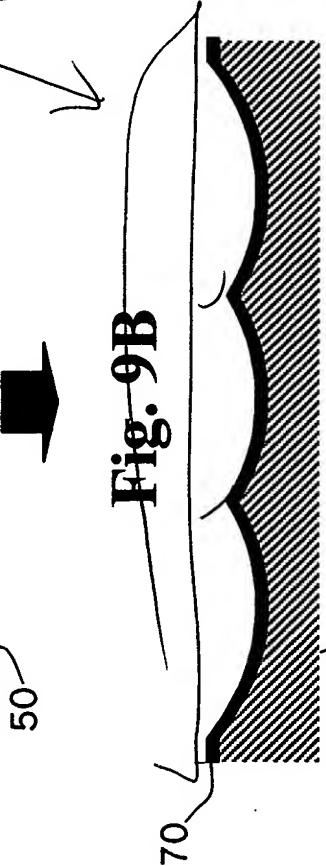


Fig. 9C

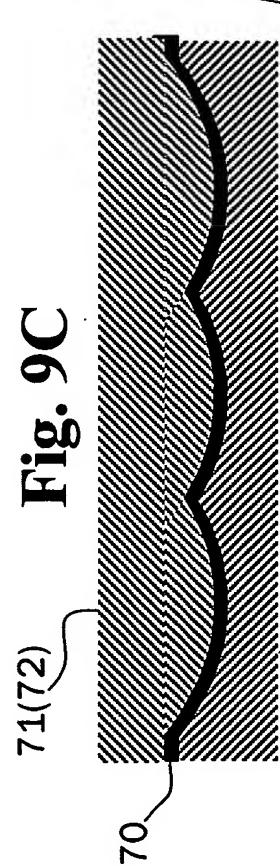
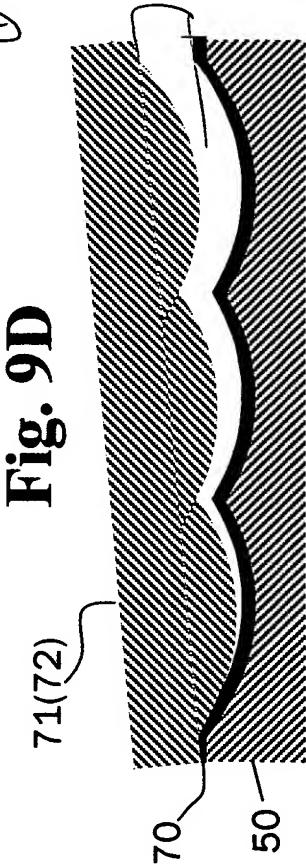
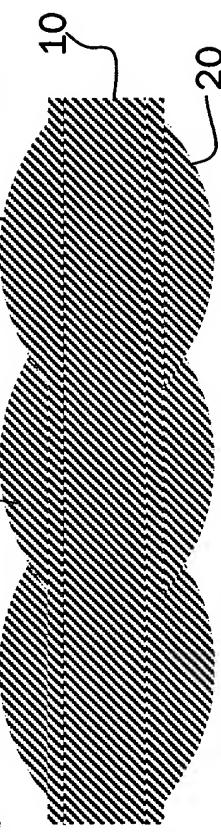
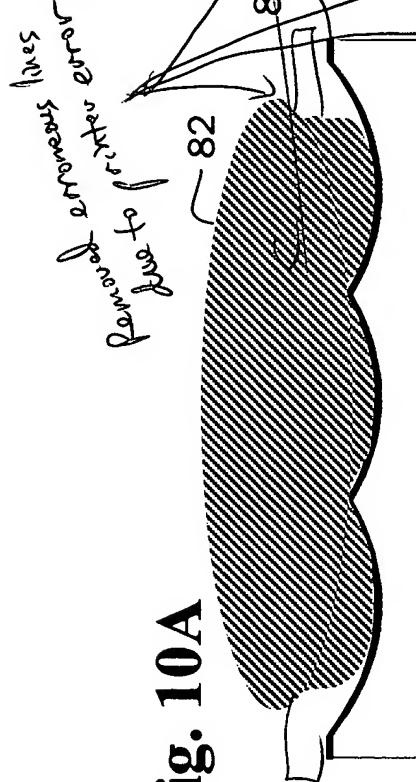
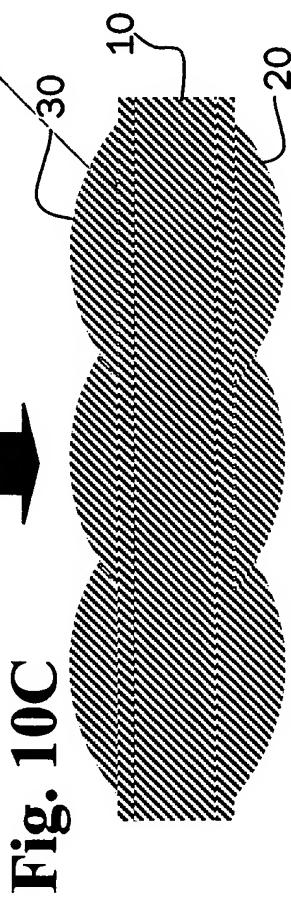
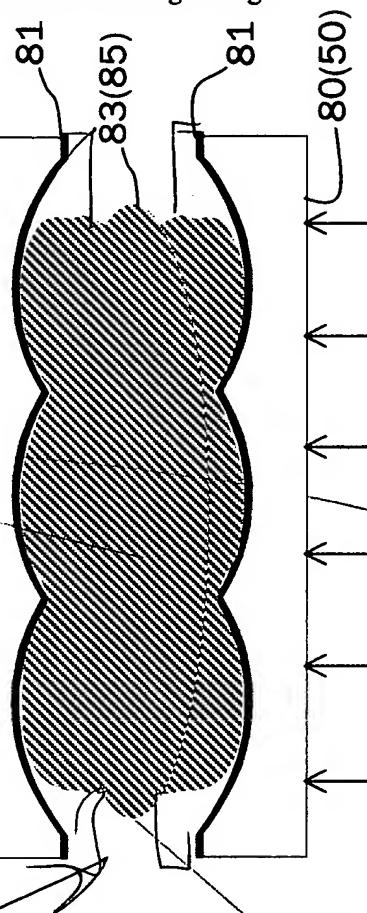
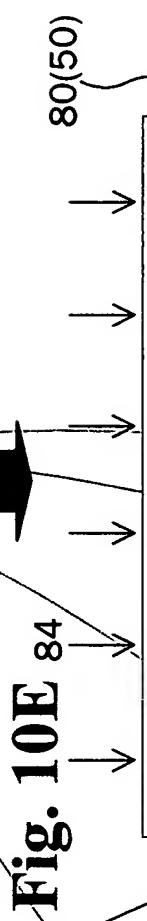
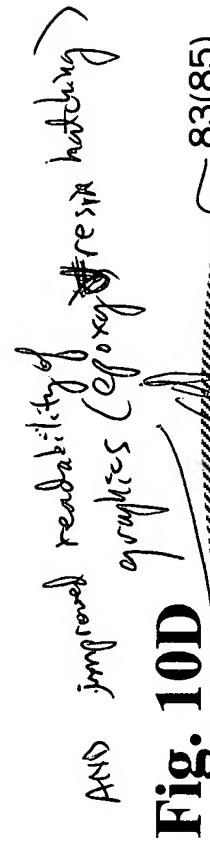
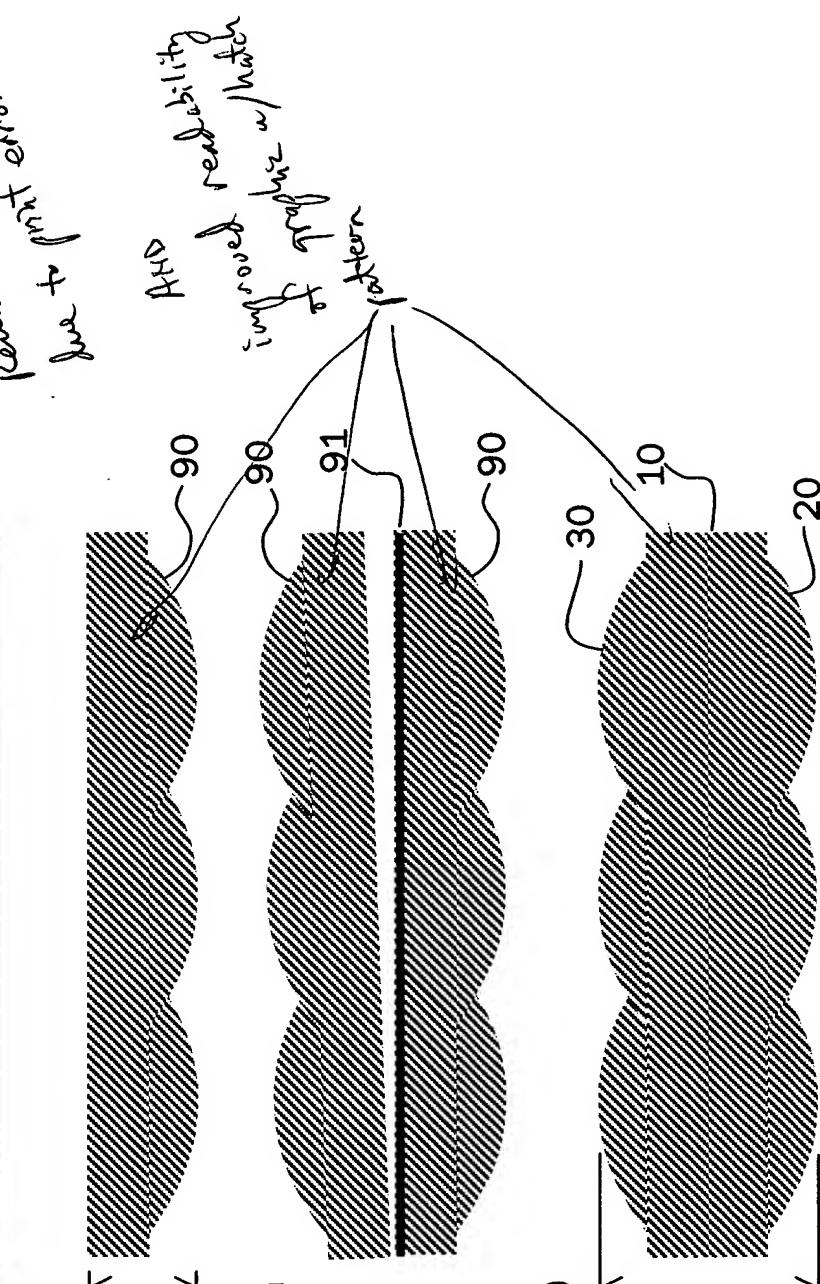
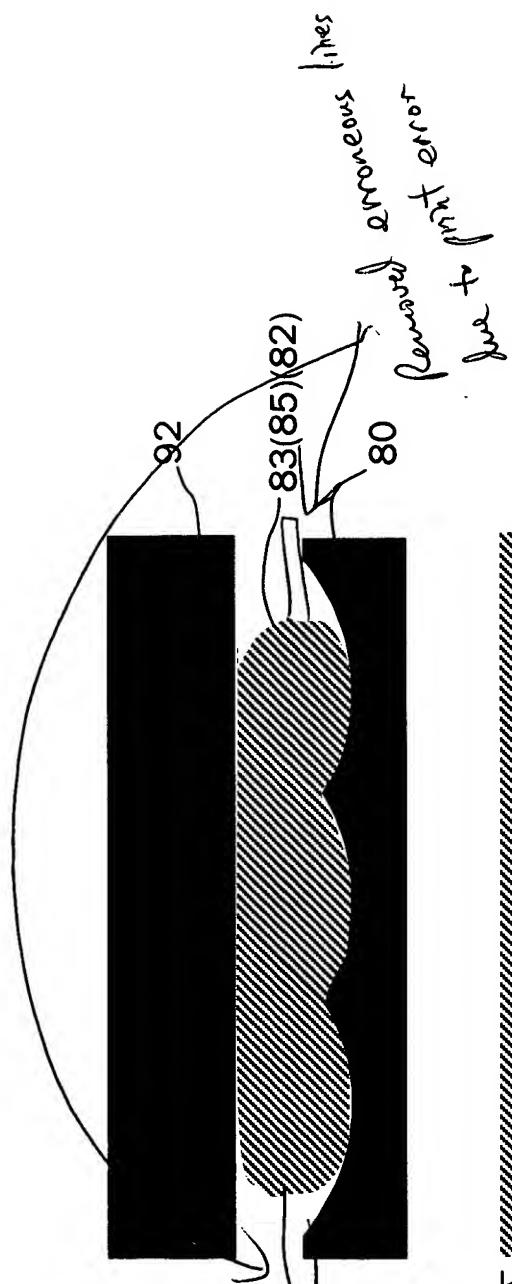


Fig. 9D







$\approx \frac{t}{2}$

Fig. 11C



$\approx t$

Fig. 12B

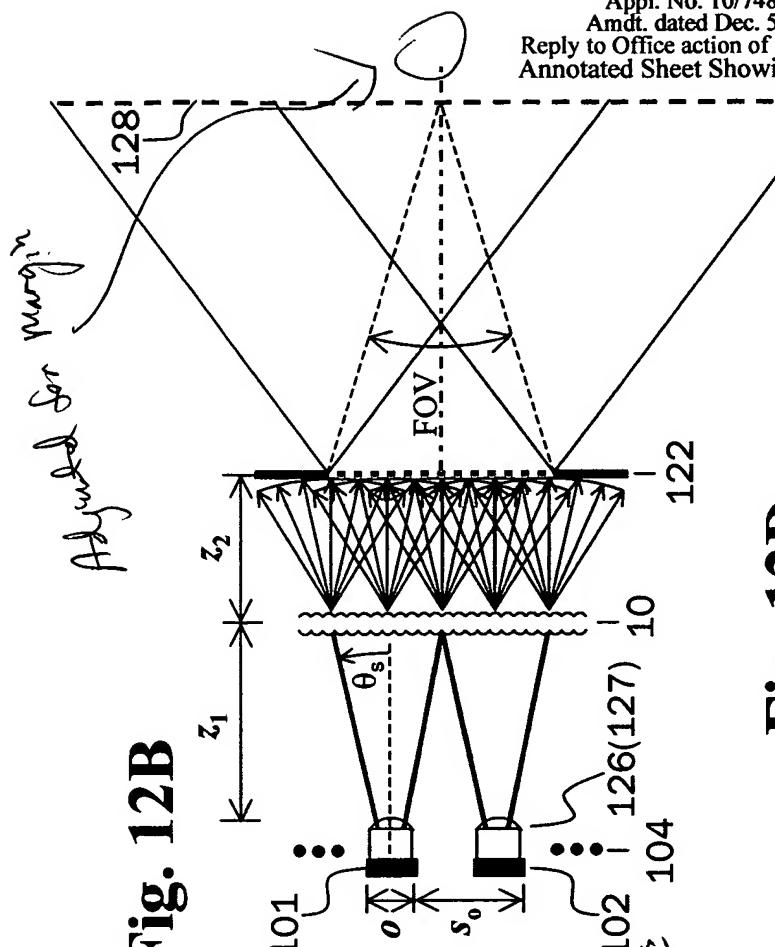


Fig. 12C

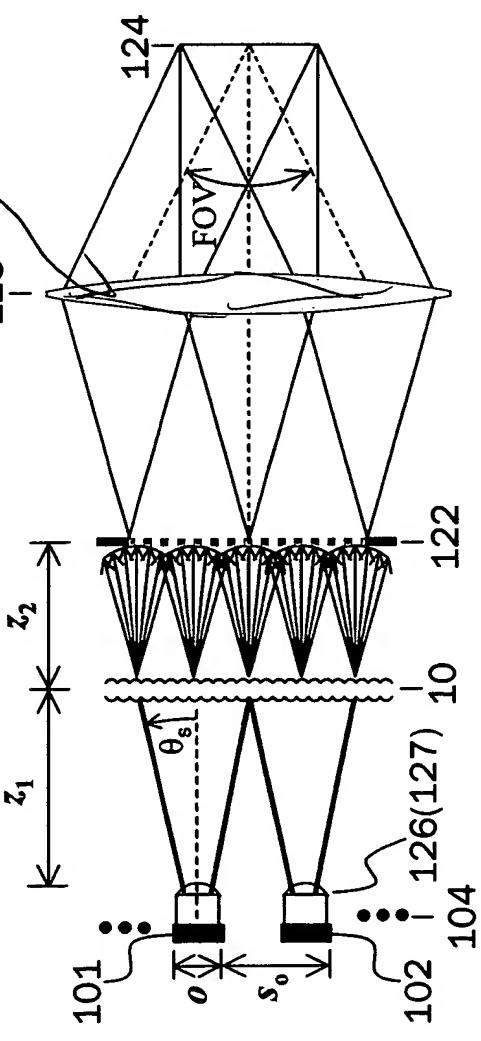
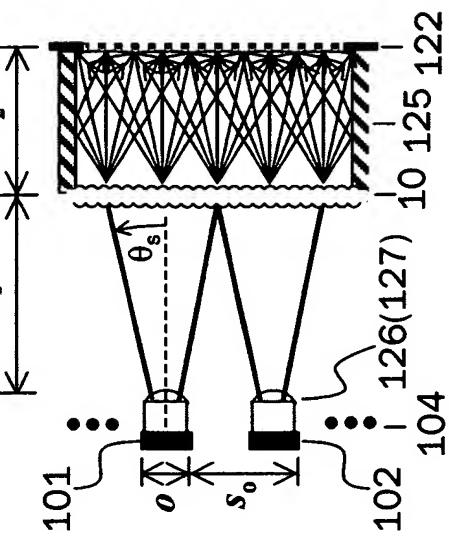


Fig. 12D



Annotated for
 May 2006

Fig. 14B

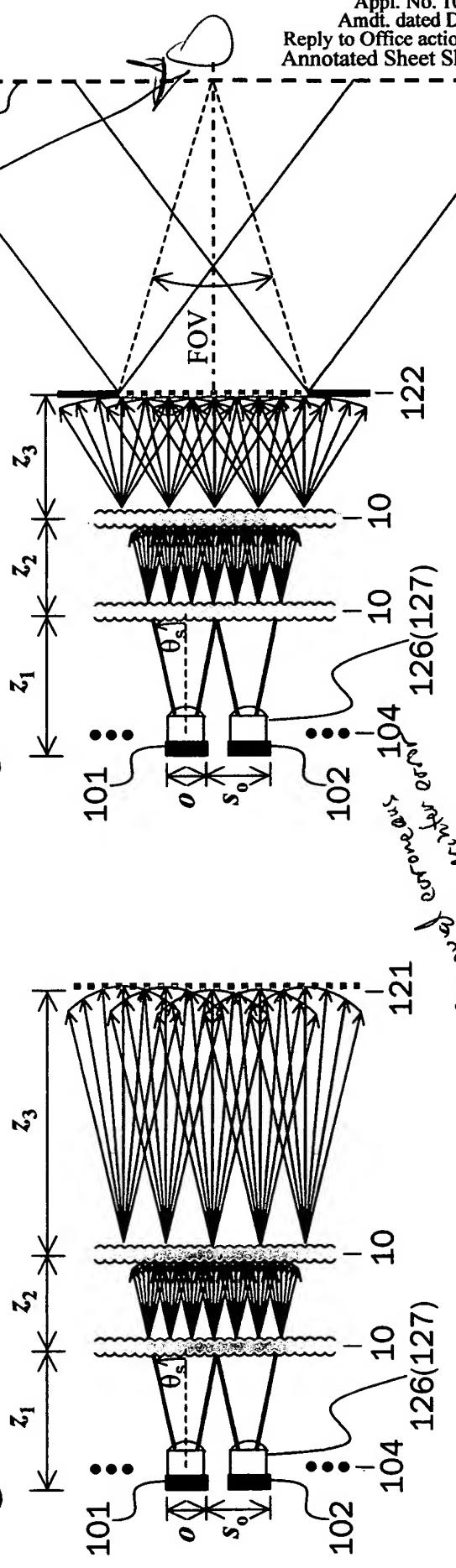


Fig. 14C

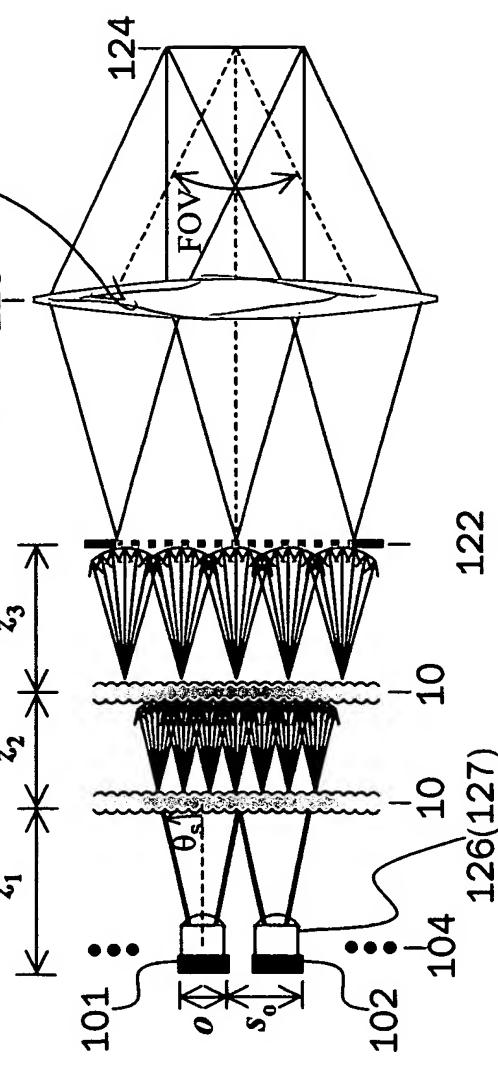
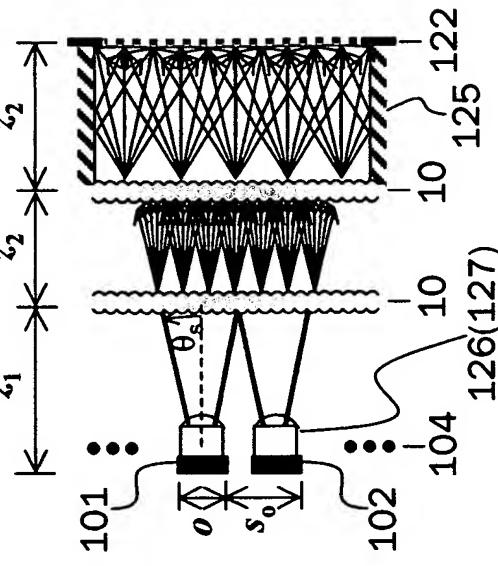


Fig. 14D



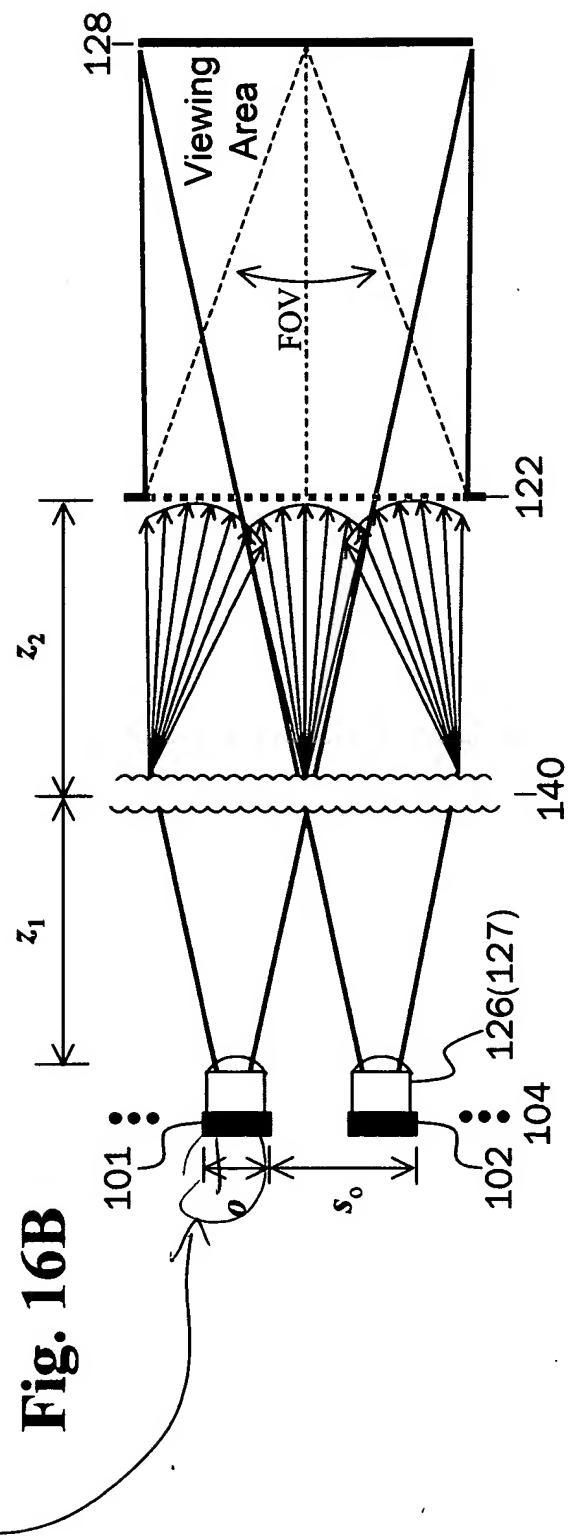
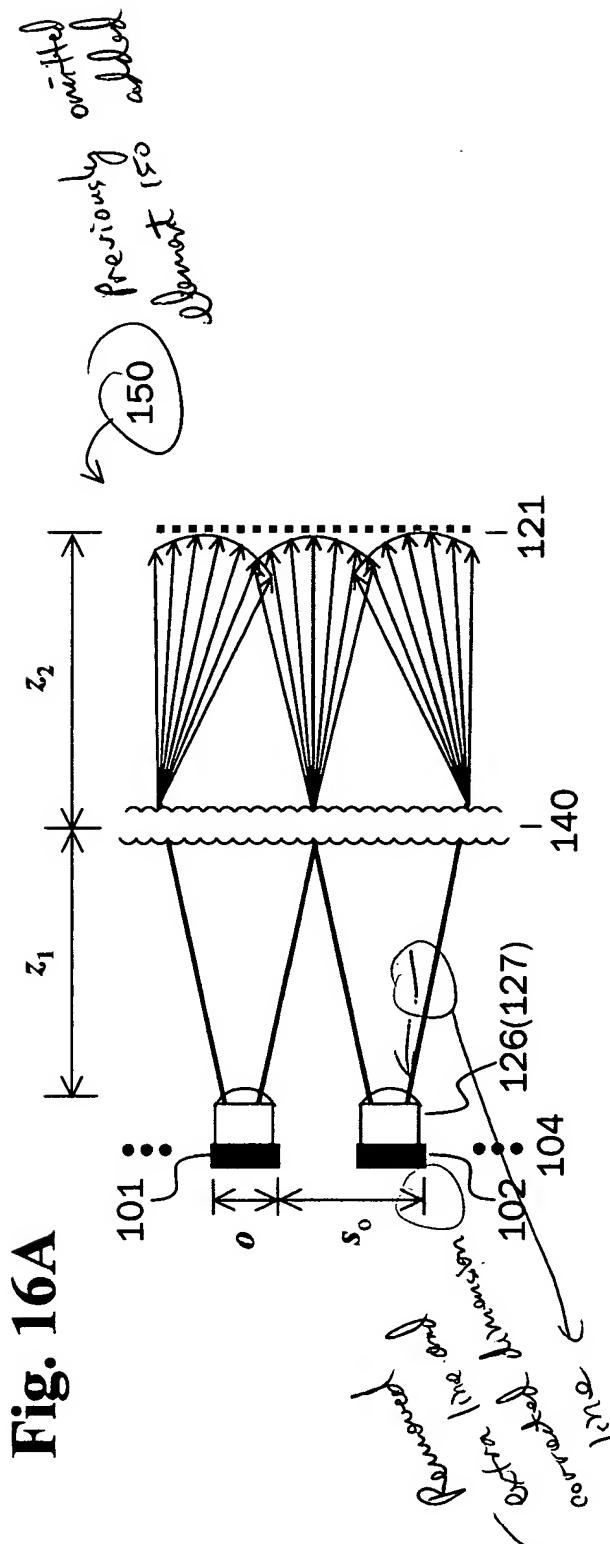


Fig. 16C

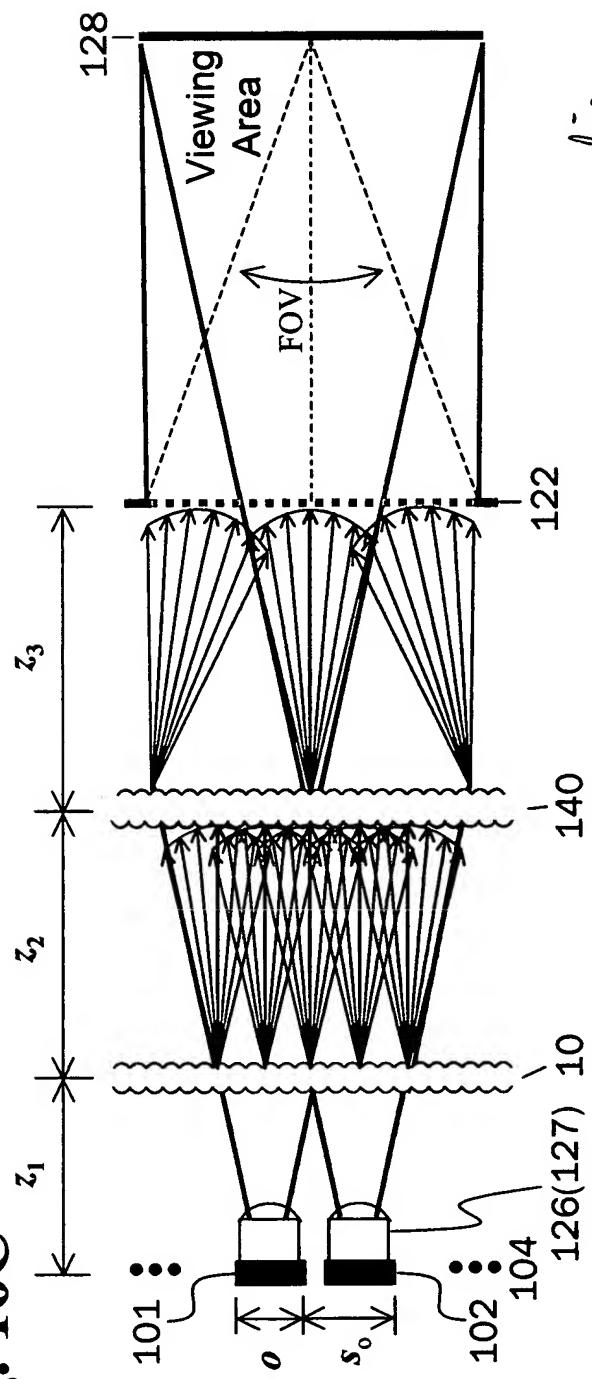
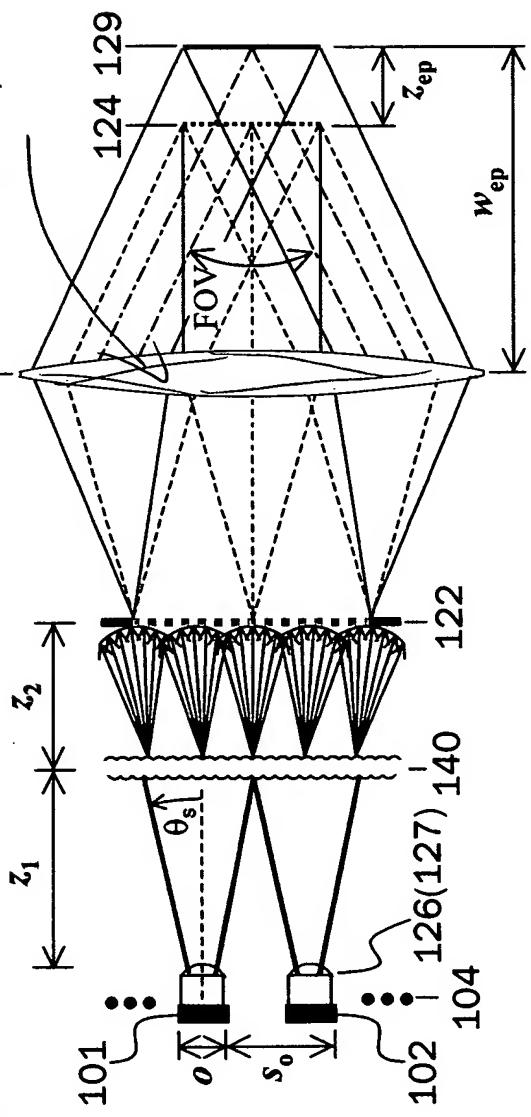


Fig. 16D



REFLECTIVE
LIGHT HOMOGENIZING
SHEET / FILM

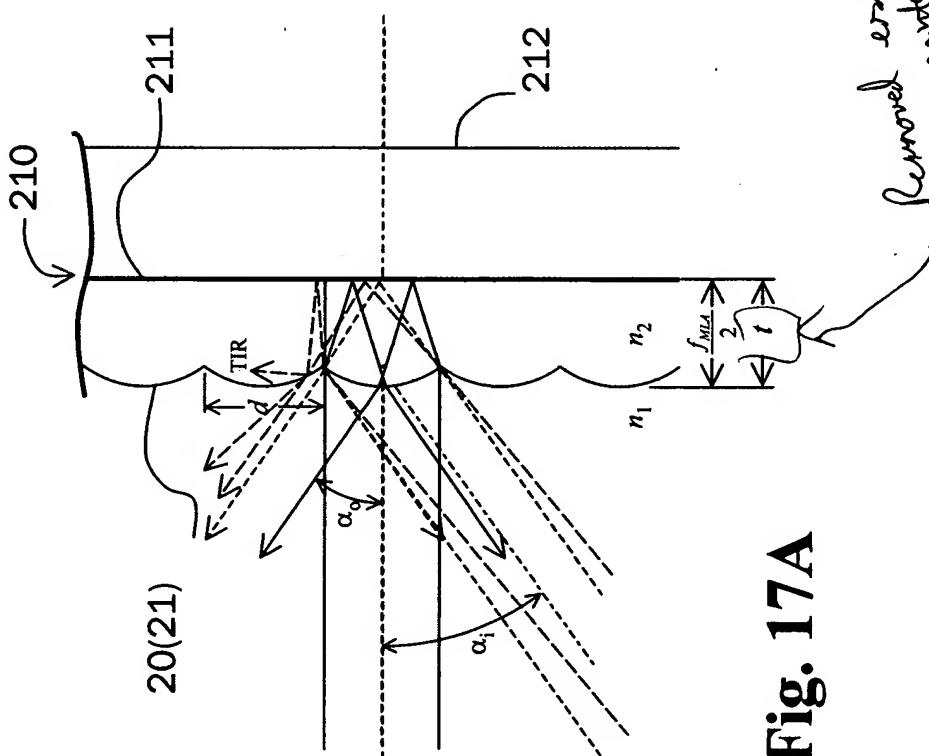


Fig. 17A

Removed erroneous lines
due to minor error
arround text

Fig. 17B

**REFLECTIVE
 LIGHT HOMOGENIZING
 SHEET / FILM
 With Waveplate
 (^{"Y₁-wave"} w/
 "replaced
 reference
 waveplate"
 term removed)**

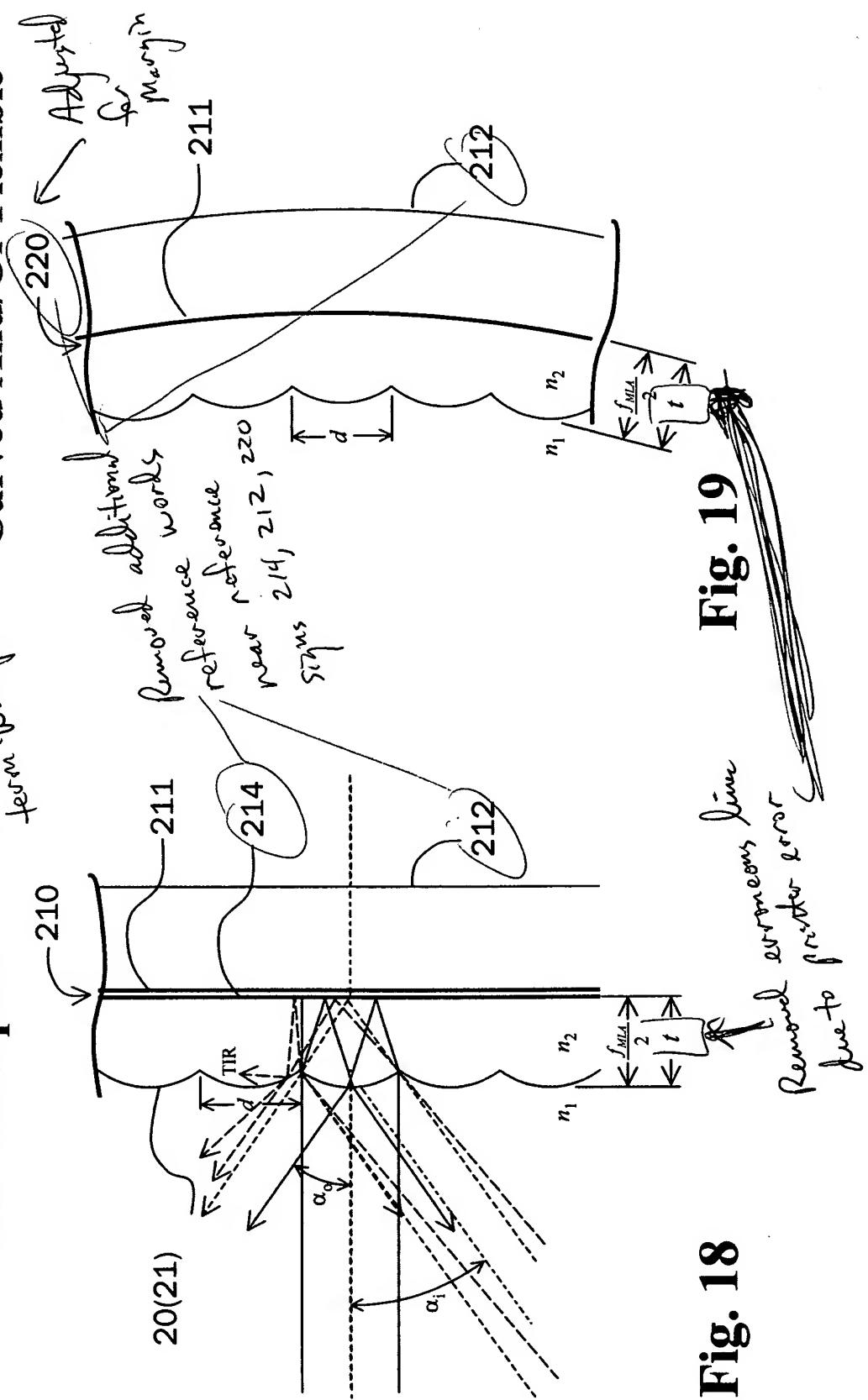


Fig. 18

Fig. 19

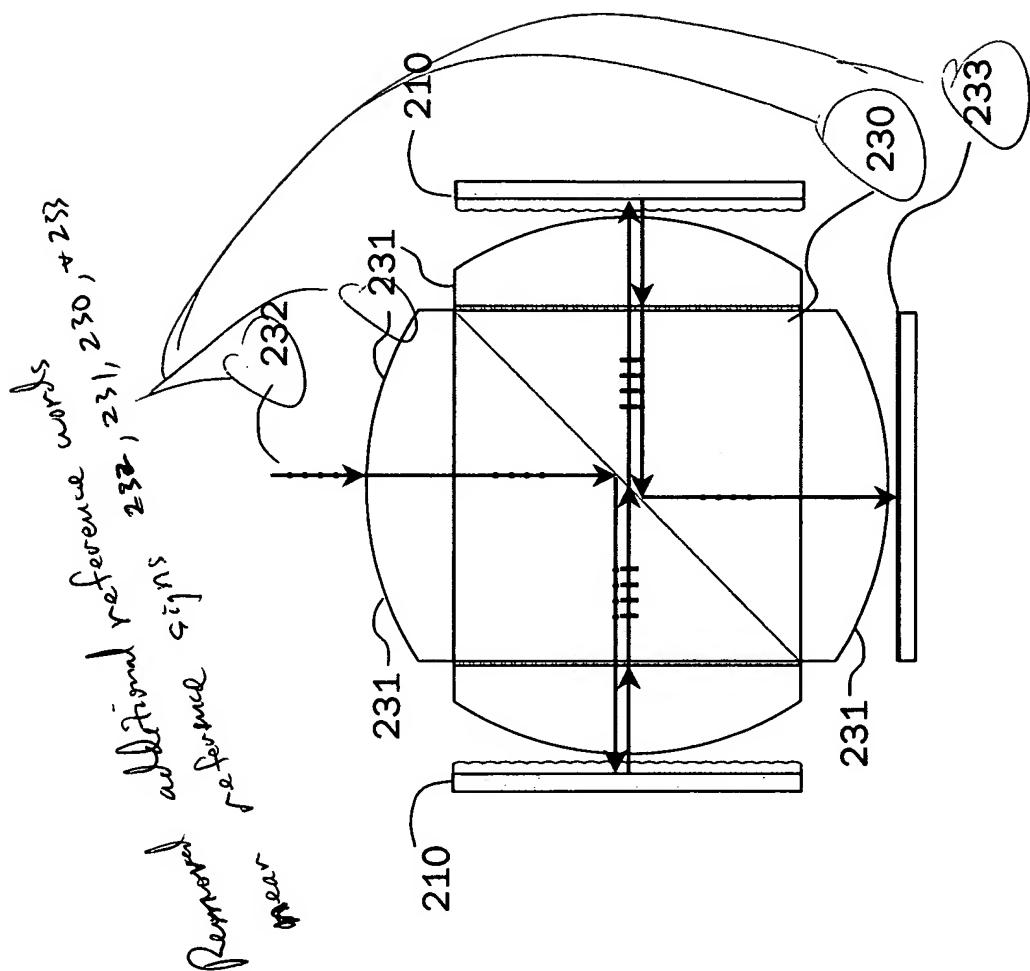


Fig. 20

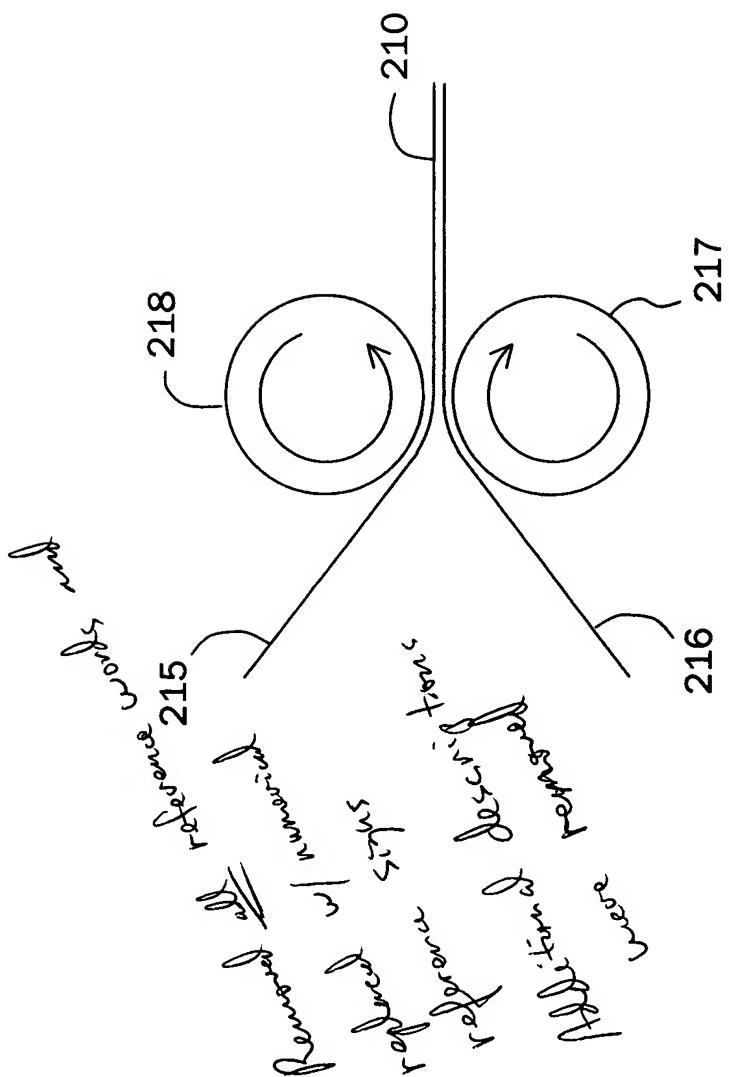


Fig. 21

— Revised additional descriptive text title —

Fig. 22A

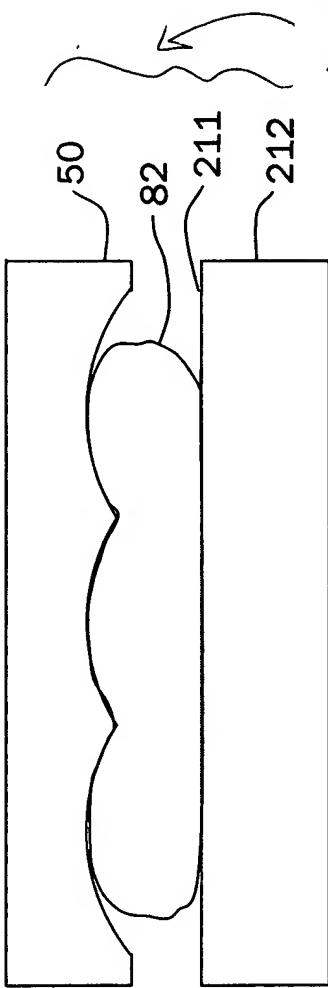


Fig. 22B

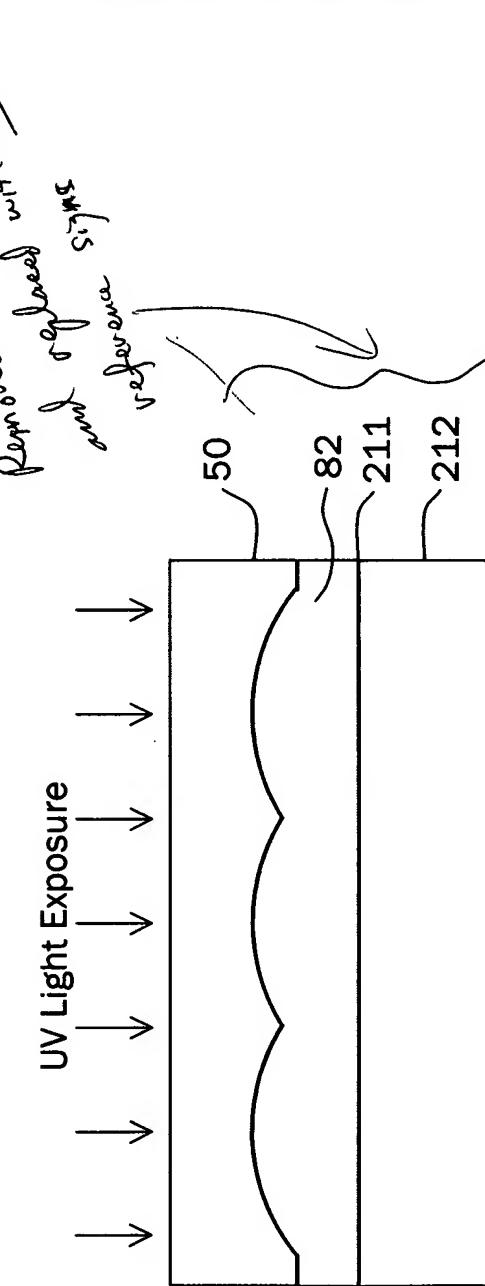
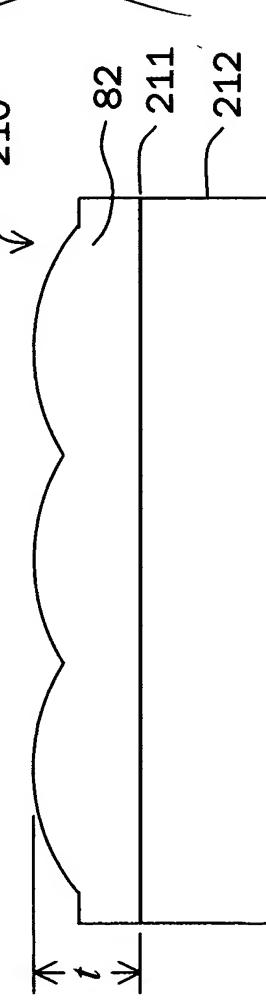


Fig. 22C



— removed addition descriptive text little —

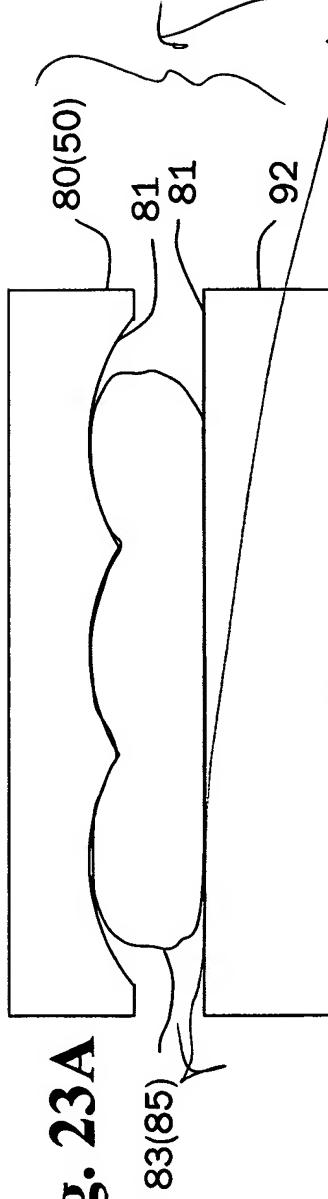


Fig. 23A

Fig. 23B

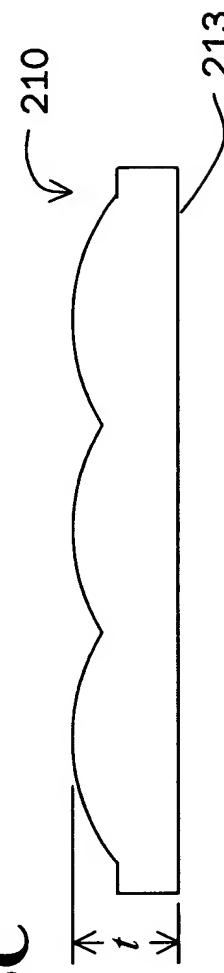
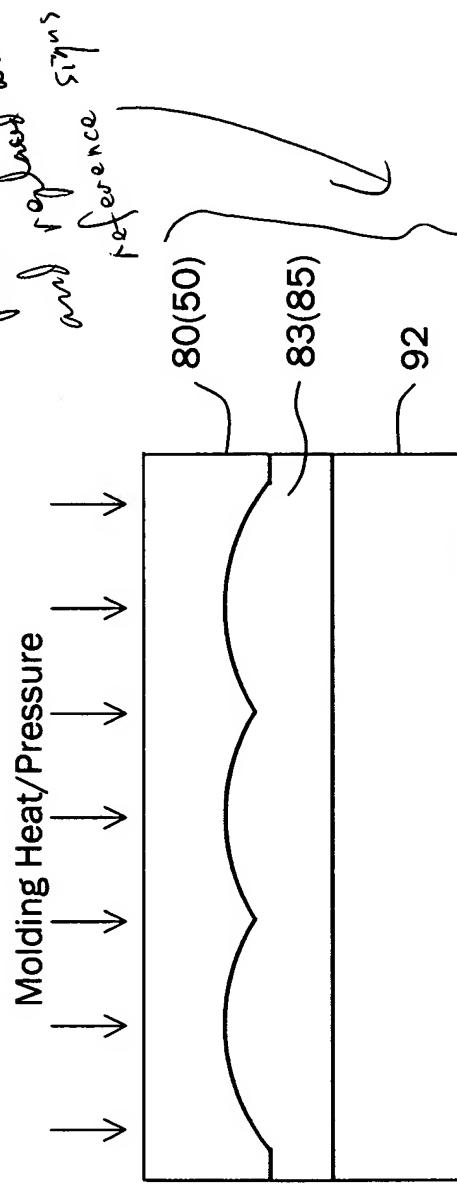


Fig. 23C